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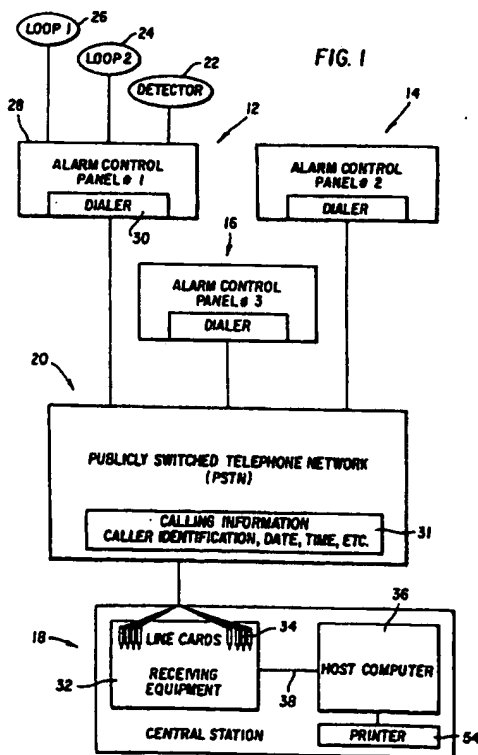
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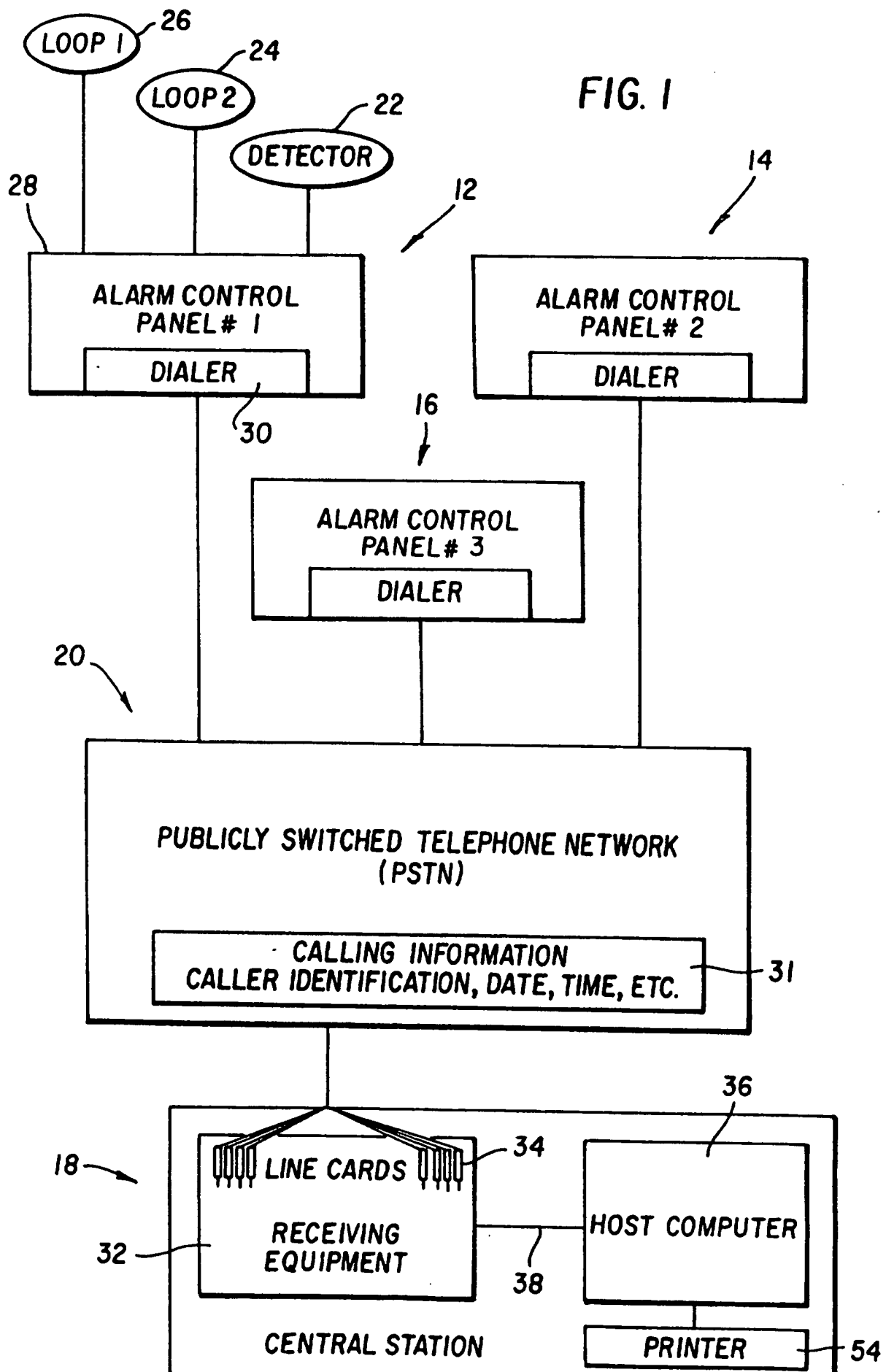
(58) Field of Search

**UK CL (Edition O) H4K KOB****INT CL<sup>6</sup> H04M****ONLINE: WPI**(54) **Security system using caller ID**

(57) A security system central monitoring station 18 uses calling information from a publicly switched telephone network 20 to select between alternative handshakes before answering a respective alarm panel call. A caller identification is detected after the first ring before lifting the receiver to complete the connection. The monitoring station retrieves the proper handshake from memory to communicate with the reporting panel and uses that handshake with the proper communications format as soon as it picks up the calling line.



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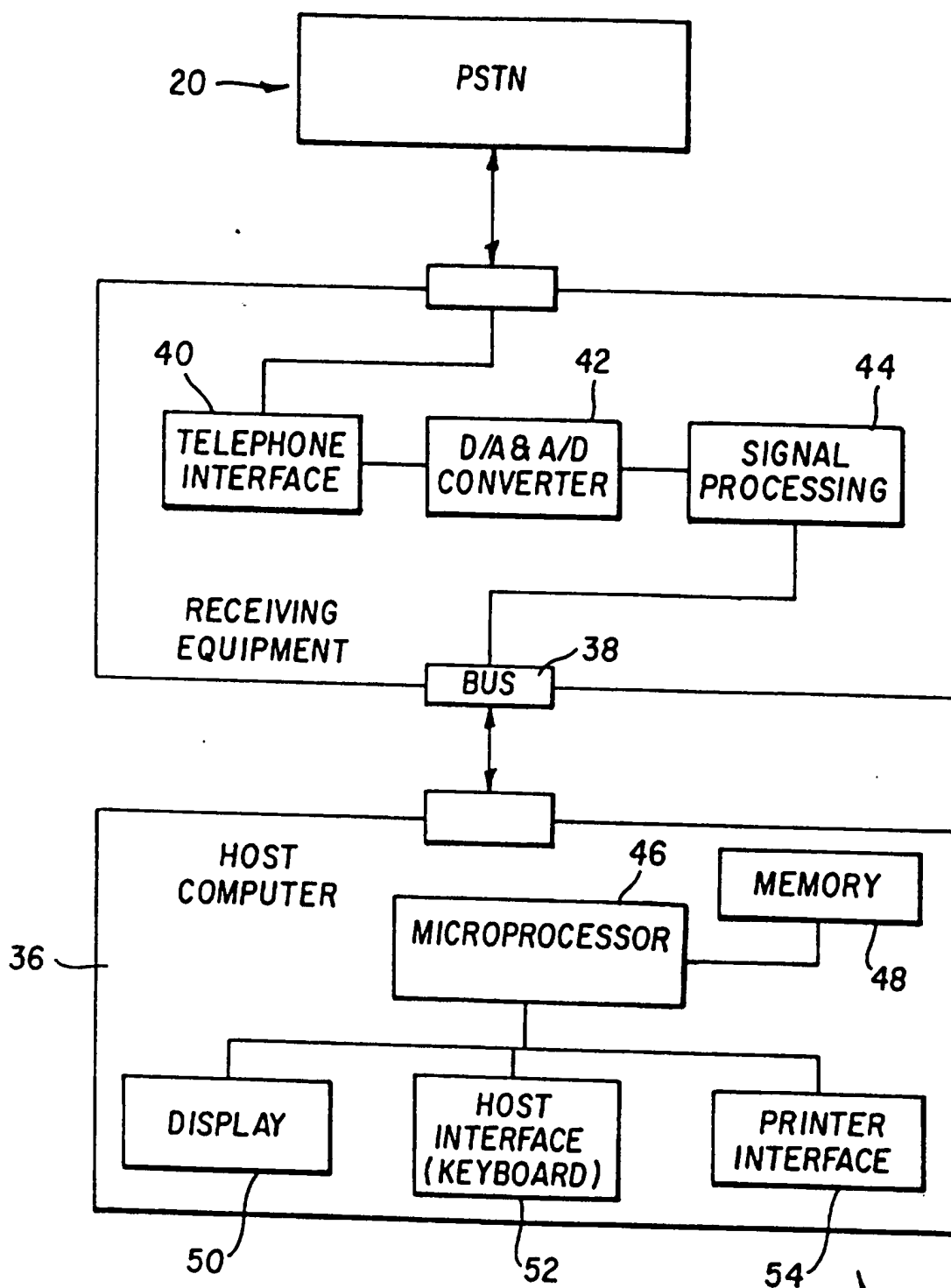


FIG. 2

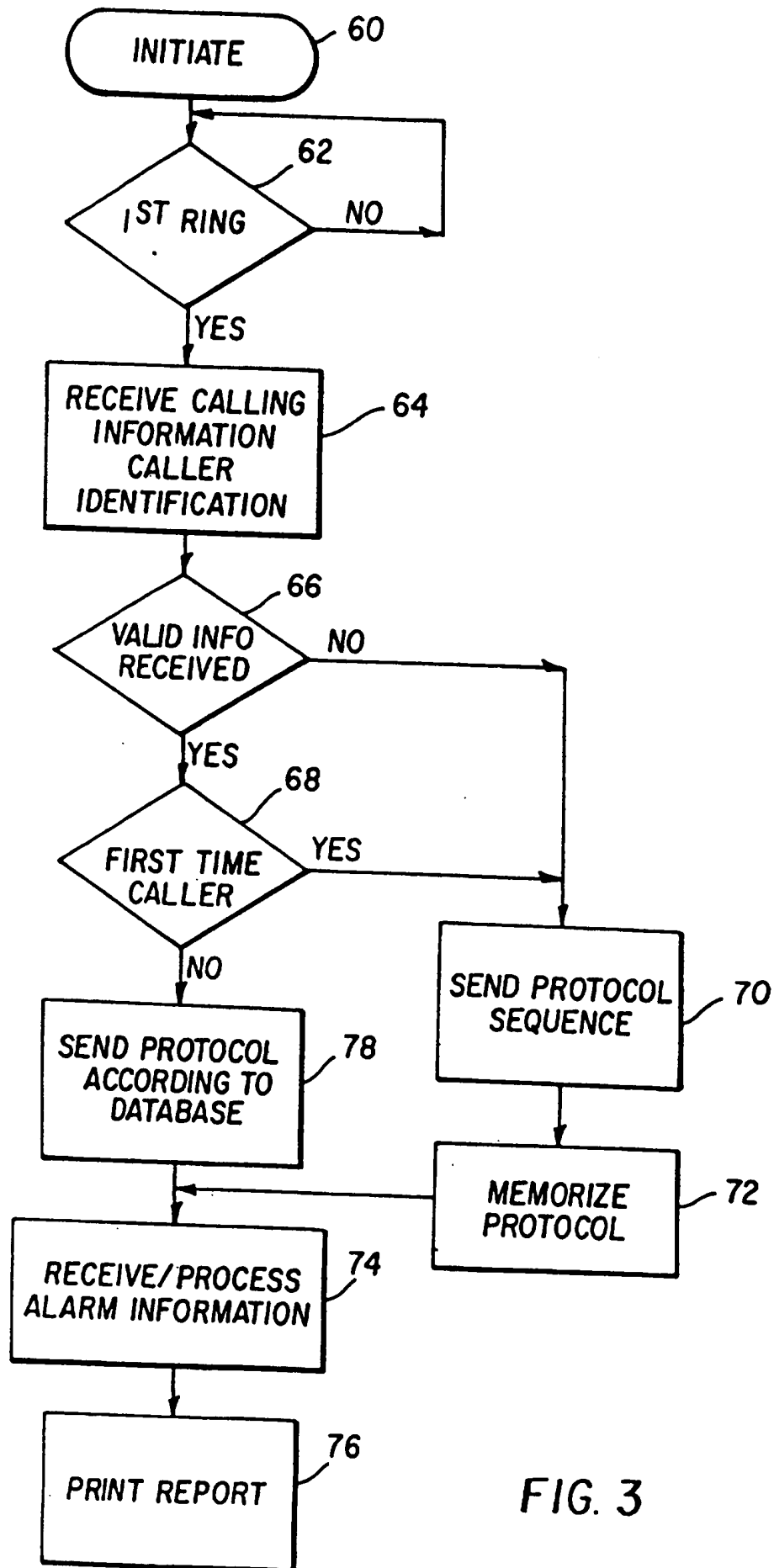


FIG. 3

SECURITY SYSTEM USING CALLER IDENTIFICATIONDESCRIPTION5 Field of Invention

The invention relates to security systems, such as fire and intruder detection systems, that report alarm information to a central monitoring station over a publicly  
10 switched telephone network.

Background of the Invention

Many security systems automatically report alarms  
15 to a service company that is instructed to follow predetermined procedures appropriate for the event that caused the alarm. When an alarm occurs, a local control panel at the secured premises dials a telephone number for the service to initiate a call and transmit the alarm  
20 information. The service, however, monitors many such systems and must first determine the format of the transmitted information. A central receiver answers the call and starts a preprogrammed sequence of tones, frequently called handshakes, negotiating with the reporting panel.  
25 When the panel detects the handshake associated with its communications format, the negotiations are completed and the panel sends the alarm information to the receiver. The receiver acknowledges successful reception, decodes the alarm signal and forwards the decoded message to a computer  
30 and/or printer for further processing.

Many communications formats are used today in security panels marketed by numerous manufacturers over different time periods. Modern receivers preferably have the

versatility to handle eight or more such formats, typically the most common, but there is significant delay before connections are completed with formats toward the end of the preprogrammed handshake sequence. If each successive  
5 handshake takes one or two seconds, for example, with a pause of four seconds between handshakes, more than twenty seconds are required to begin negotiations with the format that is fifth in line. For a large service, which monitors hundreds of high capacity lines, the accumulated tariffs can  
10 be substantial.

### Summary of the Invention

The present invention is directed to improvements  
15 in security systems and to overcoming one or more of the problems set forth above. Briefly summarized, according to one aspect of the invention, a central security system monitoring station uses calling information from the telephone network to select between alternative handshakes  
20 before answering a respective alarm panel call. A caller identification is detected after the first ring, for example, before lifting the receiver to complete the connection. The monitoring station retrieves the proper handshake from memory to communicate with the reporting  
25 panel and uses that handshake as soon as it picks up the calling line.

According to more specific features, the monitoring station selects between alternative actions depending on previously memorized information. A) If the  
30 call is the first call from a respective alarm panel, the caller identification and handshake information may be missing from memory. The monitoring station then transmits a preprogrammed sequence of handshakes to identify the format used by the reporting panel and stores the identified  
35 information in memory with the caller identification. B) If

the caller identification and handshake information is in memory, it uses the memorized information eliminating the need for the preprogrammed sequence.

5 The invention includes a process for completing a call over a switched telephone network between a central alarm station and one of a plurality of respective alarm panels. The process includes the steps of detecting calling information from a telephone network before answering the call; using the calling information to select between  
10 alternative communications protocols to answer the call; and, receiving alarm information from a respective alarm panel using the selected protocol.

In accordance with the invention, the monitoring station often is able to eliminate the preprogrammed  
15 handshake sequence, significantly reducing telephone tariff charges and speeding connections with reporting alarm panels.

These and other features and advantages of the invention will be more clearly understood and appreciated  
20 from a review of the following detailed description of the preferred embodiments and appended claims, and by reference to the accompanying drawings.

#### **Brief Description of the Drawings**

25

Figure 1 is a block diagram representing a security system according to a preferred embodiment of the invention, including control panels linked over a publicly switched telephone network to a central monitoring station.

30

Figure 2 is a block diagram depicting features of the central monitoring station in more detail.

Figure 3 is a flow diagram summarizing the operation of central monitoring station according to the preferred embodiment.

35

Detailed Description of the Invention

Referring now to the drawings, beginning with Figure 1, the preferred embodiment includes a plurality of  
5 local security systems 12, 14 and 16, suitable for communicating with a central monitoring station 18 through a publicly switched telephone network 20.

The local security systems each comprise multiple sensors 22 coupled directly or through loops 24 and 26 to a  
10 local alarm control panel 28. The sensors are active and/or passive devices that detect a variety of security related events, usually including fire and intrusion. Fire detectors often sense rapid temperature changes, smoke or other combustion products. Intrusion detectors typically sense  
15 body heat, Doppler frequencies, vibrations or sound. When such intended events are detected an alarm signal is transmitted to the local alarm control panel 28. The alarm control panel activates liquid crystal displays (LCDs) or light emitting diodes (LEDs) identifying the loop or  
20 detector in alarm and sounds the alarm through sirens, horns, strobes, and the like. The sounders and strobes are located on the secured premises usually in the vicinity of the panel.

The control panel 28 also activates dialer 30 to  
25 initiate a telephone call through publicly switched telephone network (PSTN) 20 and transmits alarm information over the network to central monitoring station 18. The dialer 30, which can be chosen from known designs, typically is integrated with other alarm panel cards and is  
30 preprogrammed with the telephone number of station 18. It initiates the call and then starts, or listens for the central station to start, a sequence of handshakes



negotiating the format to be used to transmit the alarm data.

Publicly switched telephone network (PSTN) 20 employs wired or wireless links, including land lines, 5 cellular communications, radio frequency or microwave channels and/or other systems that provide public telephone networking services. Once the connection is established, and the format negotiations completed, the network transmits or carries signals containing the alarm information data from 10 the reporting alarm control panel 28 to central station 18. The network also provides calling information to the dialed station, in this case central station 18. The calling information is provided by a network computer from its memory 31 and is peculiar to the telephone service used by 15 the panel. It typically includes a caller identification, preferably the telephone number of the telephone service at panel 28. The calling information also may include other data, usually the identity of the subscriber to the calling telephone service and the date and the time the call was 20 initiated. This calling information is available to the dialed station after the first ring and before the call is answered.

Central monitoring station 18 is operated by a service that may monitor thousands of security systems using 25 hundreds of high capacity phone lines from the publicly switched telephone network (PSTN). Alarm information can be reported to the central station from many lines essentially simultaneously. The term central station is used in this context to mean a station that handles many remote security 30 systems. It may be centralized or distributed in a geographical sense.

The central station includes a receiver or receiving equipment 32 coupled to the publicly switched

telephone network 20 through a data access arrangement, preferably multiple line cards 34, and to a host computer 36 through an appropriate bus 38. The preferred bus uses time division multiplexing.

5               Referring now more specifically to Figure 2, the receiving equipment 32 comprises the line cards, depicted as telephone interface 40, an analog to digital converter 42 and signal processor 44. The host computer includes a microprocessor 46 with associated memory 48 and suitable  
10 interfaces, such as display 50, keyboard 52 and printer 54. Although the receiving equipment 32, and its component parts, are defined separately from host computer 36, other embodiments of the invention might mix the components and functions with no clear line between the receiver equipment  
15 and computer.

              The central monitoring station 18 uses the calling information from the publicly switched telephone network (PSTN) 20 to select between alternative communications protocols, including handshakes and communications formats,  
20 before answering a respective control panel call. The caller identification is detected after the first ring and before lifting the receiver to complete the connection. The central monitoring station then uses the caller identification to retrieve the proper communications protocols from memory 48  
25 and communicates with the reporting panel using the proper handshake and format as soon as it picks up the calling line.

              Referring to Figure 3, the operation of the central monitoring station 18 is summarized in a flow  
30 diagram. Calls initiated by a local alarm control panel 12 (Figure 1) cause a line to ring at central station 18 (Figure 1). Initiation of this sequence is represented at box 60 (Figure 3), The first ring is represented at box 62.

After the first ring, and before picking up the line, receiving equipment 32 (Figure 1) retrieves and decodes the calling information, box 64 on Figure 3. Preferably the calling information is a caller identification in the form of a telephone number. In any event, the calling information includes a unique identifier of the telephone service used by the calling control panel. Still before picking up the line, the receiving equipment checks the number for validity, box 66, and queries the host computer 36 (Figure 2) and its memory 48, looking for the corresponding number.

If the call is a first call from the station identified by the calling information, no corresponding number will be found in memory 48. The receiving equipment then will answer the call by picking up the line and sending a preprogrammed sequence of alternative handshakes, box 70, negotiating with the sending panel until the proper data format is identified. When the negotiations are successful, the handshake and format information is stored with the calling information in memory 48, box 72, and the alarm information is retrieved processed and printed, boxes 74, and 76.

If the call is a second or subsequent call from the station identified by the calling information, a corresponding number will be found in memory 48. The receiving equipment then retrieves and uses the previously memorized information to select the proper handshake and format, box 78, eliminating the need for the preprogrammed sequence. The call is answered with the proper handshake and the alarm information is retrieved in the proper format processed and printed.

Although not a necessary feature of the present invention, set-up calls preferably are made from each alarm panel when it is first installed, thereby recording the calling information and communications protocols when the system is first activated.

It should now be apparent that the invention includes apparatus and a process for completing a call over a switched telephone network between a central monitoring station and one of a plurality of respective alarm panels.

- 5 The network calling information, preferably a telephone number, is retrieved from a telephone network before answering the call and used to select between alternative communications protocols. Then, when the call is answered, the proper handshake information is sent immediately and the
- 10 proper data or communications format is used to receive alarm information from the calling alarm panel.

- In accordance with the invention, the monitoring station often is able to eliminate the preprogrammed handshake sequence, significantly reducing telephone tariff
- 15 charges and speeding connections with reporting alarm panels.

- While the invention is described in connection with a preferred embodiment, other modifications and applications will occur to those skilled in the art. The
- 20 claims should be interpreted to fairly cover all such modifications and applications within the true spirit and scope of the invention.

PARTS LIST

	Reference No.	Part
	12.	Local security system.
5	14.	Local security system.
	16.	Local security system.
	18.	Central monitoring station.
	20.	Publicly switched
10		telephone network (PSTN).
	22.	Sensor.
	24.	Sensor loop.
	26.	Sensor loop.
15	28.	Local alarm control panel.
	30.	Auto dialer.
	31.	Memory.
	32.	Receiving equipment.
20	34.	Telephone line cards.
	36.	Host computer.
	38.	Bus.
	40.	Telephone interface.
	42.	A/D converter.
25	44.	Signal processor.
	46.	Microprocessor.
	48.	Memory.
	50.	Display.
	52.	Keyboard.
30	54.	Printer.

CLAIMS:

10

1           1.    A security system central station for  
2   receiving alarm information from a plurality of remote alarm  
3   panels, said respective panels initiating calls and  
4   transmitting said information over a public switched  
5   telephone network that provides calling information  
6   pertaining to said call initiation; said central station  
7   comprising: .

8                a receiver answering said calls and receiving said  
9   alarm information;

10               a detector detecting said calling information from  
11   said network before said receiver answers a respective call;  
12   and,

13               a protocol selector selecting between a plurality  
14   of communications protocols based on said detected calling  
15   information and setting said receiver to use said selected  
16   protocol before said receiver answers said respective call.

1           2.    The invention of claim 1, wherein said  
2   communications protocols include handshake information for  
3   answering said calls and communications formats for  
4   transmitting said alarm information.

1           3.    The invention of claim 1, wherein said alarm  
2   panel initiating said respective call uses a predetermined  
3   telephone service and said calling information includes a  
4   caller identification uniquely identifying said telephone  
5   service.

1           4.    The invention of claim 3, wherein:  
2                said central station includes memory for storing  
3   respective caller identifications linked to proper  
4   communications protocols;  
5                said protocol selector retrieves a proper  
6   communications protocol from said memory to complete a call  
7   associated with a caller identification in said memory; and,

8                   said central station transmits a predetermined  
9 sequence of protocols for determining a proper protocol to  
10 complete a call associated with a caller identification not  
11 in said memory.

1                   5. The invention of claim 4, wherein said  
2 central station stores respective caller identifications in  
3 said memory linked to proper communication protocols  
4 determined by said transmitted predetermined sequence of  
5 protocols.

1                   6. A security system including a central station  
2 having communications equipment receiving: a) calling  
3 information from a public switched telephone network; and,  
4 b) calls containing alarm information from a plurality of  
5 remote alarm panels using said network; characterized in  
6 that:

7                   said central station uses said calling information  
8 from said network to select between alternative  
9 communications formats before answering a respective call.

1                   7. The invention of claim 6, wherein:  
2                   said central station includes memory for storing  
3 respective caller identifications linked to proper  
4 communications formats;  
5                   said central station retrieves a proper  
6 communications format from said memory to complete a call  
7 associated with a caller identification in said memory; and,  
8                   said central station transmits a predetermined  
9 sequence of handshakes for determining a proper format to  
10 complete a call associated with a caller identification not  
11 in said memory.

1                   8. The invention of claim 7, wherein said  
2 central station stores respective caller identifications in  
3 said memory linked to proper communication formats

4 determined by said transmitted predetermined sequence of  
5 handshakes.

1           9. A process for completing a call over a  
2 switched telephone network between a central alarm station  
3 and a one of a plurality of respective alarm panels; said  
4 process comprising:  
5           detecting calling information from said telephone  
6 network before answering said call;  
7           using said calling information to select between  
8 alternative communications protocols and using said selected  
9 protocol to answer said call;  
10           receiving alarm information from a respective  
11 alarm panel using said selected protocol.

1           10. The process of claim 9, wherein said calling  
2 information includes a caller station identification, said  
3 central station includes memory for storing respective  
4 caller identifications linked to proper communications  
5 protocols and including the further steps of:  
6           retrieving a proper communications protocol from  
7 said memory to complete a call associated with a caller  
8 identification in said memory; and,  
9           transmitting a predetermined sequence of protocols  
10 for determining a proper protocol to complete a call  
11 associated with a caller identification not in said memory

11           11. The invention of either claim 1, claim<sup>6</sup>, or claim<sup>9</sup>,  
substantially as described with reference to the drawings.





**Application No:** GB 9711878.0  
**Claims searched:** All

**Examiner:** Al Strayton  
**Date of search:** 27 August 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4K: KOB

Int Cl (Ed.6): H04M

Other: ONLINE: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	US 5 511 109 (HARTLEY...)	

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